TO:Auto-reply fax to 206 34 6201 COMPANY:

Auto-Reply Facsimile Transmission

COPY

TO: Fax Sender at 206 342 6201

Fax Information
Date Received: 2/6/2007 1:42:08 PM [Eastern Standard Time]
Total Pages: 17 (including cover page)

ADVISORY: This is an automatically generated return receipt confirmation of the facsimile transmission received by the Office. Please check to make sure that the number of pages listed as received in Total Pages above matches what was intended to be sent. Applicants are advised to retain this receipt in the unlikely event that proof of this facsimile transmission is necessary. Applicants are also advised to use the certificate of facsimile transmission procedures set forth in 37 CFR 1.8(a) and (b), 37 CFR 1.6(f). Trademark Applicants, also see the Trademark Manual of Examining Procedure (TMEP) section 306 et seq.

Received Cover Page =======>

02-06-07 10:38AM FROM-MERCHANT & GOULD P C 206-342-6201 T-687 P 001 F-336

Merchant & Gould
An Intellectual Property Law Firm

701 Fifth Avenue, Suite 4100
Seattle, Washington
98104-7097 USA
tel 206.342.6200
fax 206.342.6201
www.merchant-gould.com

Fax Transmission

TO: Commissioner for Patents
ATTN: Terry Lee Englund
P.O. Box 1450
Alexandria, VA 22313-1450

FROM: Brett A. Hertzberg
OUR REF: 50019.273US01/P05808
(DAI/vab)

PTO FAX NUMBER 1-571-273-8300
Total pages, including cover letter: 17

Title:	CURVATURE CORRECTED BANDGAP CIRCUIT
Applicant:	Siew Siong Tee
Serial No.:	10/808,635
Filed:	March 24, 2004
Group Art Unit:	2838
Our Ref. No.:	50019.273US01/P05808
Confirmation No.	6093

Attached is a resubmission of a filing, previously received by the PTO on January 22, 2007. The Amendment was inadvertently faxed unsigned.

Attached please find the signed Amendment together with copies of the PTO Auto-Reply Facsimile Transmission and Fax Coversheet as filed on January 22, 2007.

Please charge any additional fees or credit overpayment to Deposit Account No. 13-2725. Please consider this a PETITION FOR EXTENSION OF TIME for a sufficient number of months to enter these papers, if appropriate.

I hereby certify that this paper is being transmitted by facsimile to the U.S. Patent and Trademark Office on the date shown below.

Dated: February 6, 2007

By: Brett A. Hertzberg
Name: Brett A. Hertzberg
Reg. No. 42,660

If you do NOT receive all of the pages, please telephone us at 206.342.6200, or fax us at 206.342.6201.

DAI/vab DOT

PAGE 1/17 * RCVD AT 2/6/2007 1:42:08 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-5/11 * DNIS:2738509 * CSID:206 342 6201 * DURATION (mm-ss):02-50

Merchant & Gould
An Intellectual Property Law Firm

701 Fifth Avenue, Suite 4100
Seattle, Washington
98104-7097 USA
TEL 206.342.6200
FAX 206.342.6201
www.merchant-gould.com

Fax Transmission

TO: Commissioner for Patents
ATTN: Terry Lee Englund
P.O. Box 1450
Alexandria, VA 22313-1450

FROM: Brett A. Hertzberg
OUR REF: 50019.273US01/P05808
(BAH/ab)

COPY

PTO FAX NUMBER 1-571-273-8300
Total pages, including cover letter: 17

Title:	CURVATURE CORRECTED BANDGAP CIRCUIT
Applicant:	Siew Siong Teo
Serial No.:	10/808,635
Filed:	March 24, 2004
Group Art Unit:	2838
Our Ref. No.:	50019.273US01/P05808
Confirmation No.	6093

Attached is a resubmission of a filing, previously received by the PTO on January 22, 2007. The Amendment was inadvertently faxed unsigned.

Attached please find the signed Amendment together with copies of the PTO Auto-Reply Facsimile Transmission and Fax Coversheet as filed on January 22, 2007.

Please charge any additional fees or credit overpayment to Deposit Account No. 13-2725. Please consider this a PETITION FOR EXTENSION OF TIME for a sufficient number of months to enter these papers, if appropriate.

I hereby certify that this paper is being transmitted by facsimile to the U.S. Patent and Trademark Office on the date shown below.

Dated: February 6, 2007

By: Brett A. Hertzberg
Name: Brett A. Hertzberg,
Reg. No. 42,660

If you do NOT receive all of the pages, please telephone us at 206.342.6200, or fax us at 206.342.6201.

GEN033.DOT

COPY

S/N 10/808,635 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Siew Siong Teo	Examiner:	Terry Lee Englund
Application No.:	10/808,635	Group Art Unit:	2816
Filed:	March 24, 2004	Docket No.:	50019.273US01/P05808
Title:	CURVATURE CORRECTED BANDGAP CIRCUIT		

CERTIFICATE UNDER 37 CFR 1.6(d): I hereby certify that this correspondence is being sent via facsimile to (571)-273-8300, Commissioner for Patents, ATTN: Examiner Terry Lee Englund, P.O. Box 1450, Alexandria, VA 22313-1450 on January 22, 2007.

By: Brett A. Hertzberg
Name: Brett A. Hertzberg

AMENDMENT

VIA FACSIMILE #571-273-8300
Commissioner for Patents
ATTN: Examiner Terry Lee Englund
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to the Office Action of October 20, 2006, please amend the above-identified application as follows:

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims are reflected in the listing of claims which begins on page 4 of this paper.

Replacement Drawings are found on page 9 of this paper.

Remarks/Arguments begin on page 10 of this paper.

In the Specification

Please replace the paragraph beginning on page 1, line 20 as follows:

"An example of a modern band-gap reference circuit is illustrated as circuit 500 in FIGURE 5. As shown in the figure, two bipolar transistors (Q1, Q2) are arranged with a common base that is connected to VDD. Two resistors (R1, R2) are series connected between the emitter of the first bipolar transistor (Q1) and the reference output (VREF). Another resistor (R3) is connected between the emitter of the second bipolar transistor (Q2) and the reference output (VREF). An error amplifier (EAMP) is used to adjust the voltage of the reference output (VREF) through feedback. At steady-state, the voltage at the common point of resistors R1 and R2 is the same as the voltage at the emitter of the second bipolar transistor (Q2). The two bipolar transistors (Q1, Q2) are arranged to provide a ten-to-one (10:1) current density difference with respect to one another (Q2 to Q1). The ten-to-one current density results in a 60mV difference between the base-emitter voltages of two bipolar transistors ($\Delta Vbe = Vt*\ln(A1/A2) = 26mV*\ln(10) = 60mV$, at room temperature. A1 and A2 are the respective emitter areas of bipolar transistors Q1 and Q2. Current I1 is set to equal current I2 by means of resistors R2, R3, and feedback operation of error amplifier EAMP. The 60mV difference appears across the first resistor (R1). The voltage between VDD and the output of the error amplifier corresponds to a reference voltage (VREF) that is given as $VREF = Vbe + X*Vt$, where X is a constant that is used to scale the temperature correction factor. The temperature correction factor (X) is adjusted by the ratio of the resistors $((R2/R1)*\ln(A1/A2))$. Typical temperature corrected reference voltages of 1.25V are achieved by this configuration."

Please replace the abstract of the disclosure with the following paragraph:

"An apparatus and method provide for curvature corrected temperature variations in a band-gap reference circuit. The apparatus includes a band-gap cell, an IPTAT circuit, a resistor, and a feedback circuit. The band-gap cell is arranged to provide a band-gap voltage. The resistor circuit is coupled to both the band-gap cell and the IPTAT circuit. The feedback circuit is arranged to selectively activate the IPTAT circuit such that an additional correction factor is added to the temperature response of the band-gap cell to provide a second order curve. The IPTAT circuit can be implemented as a simple transistor that is responsive to changes in absolute temperature."

Listing of claims:

1. (Currently Amended) An apparatus for providing a temperature compensated reference signal, comprising:

a ~~bang-gap~~ band-gap cell that is arranged to provide a first signal that has a first temperature response profile at a first node, wherein the band-gap cell comprises a first bipolar device, a second bipolar device, a first resistor that is coupled between a first sense node and the first bipolar device, a second resistor that is coupled between the first sense node and a common node, a third resistor that is coupled between the common node and the second bipolar device at a second sense node, and an error amplifier that is responsive to signals from the first sense node and the second sense node, wherein the resistor circuit is coupled between an output node of the error amplifier and the common node;

a PTAT circuit that is arranged to selectively provide a second signal that has a second temperature response profile to the common node when active;

a feedback circuit that is arranged to selectively activate the PTAT circuit in response to an output from the band-gap cell; and

a resistor circuit that is coupled between the output from the band-gap circuit and the common node, wherein the resistor circuit is arranged in cooperation with the band-gap cell and the PTAT circuit to generate the temperature compensated reference signal at the common node as a combination of the first signal and the second signal such that the temperature compensated reference signal has a third temperature response profile that is determined by combination of the first temperature response profile and the second temperature response profile.

2. (Currently Amended) The apparatus of claim 1, wherein the first temperature response profile is different from the second temperature response profile. ~~such that the third temperature response profile~~

3. (Original) The apparatus of claim 1, wherein the first signal and the second signal are currents, and wherein the resistor circuit is arranged to combine the currents that are associated with the first and second signals.

4. (Cancelled) ~~The apparatus of claim 1, wherein the bandgap cell comprises:~~

~~a first bipolar device;~~

~~a second bipolar device;~~

~~a first resistor that is coupled between a first sense node and the first bipolar device;~~

~~a second resistor that is coupled between the first sense node and a common node;~~

~~a third resistor that is coupled between a second sense node and the common node; and~~

~~an error amplifier that is responsive to signals from the first sense node and the second sense node, wherein the resistor circuit is coupled between an output node of the error amplifier and the common node, and wherein the PTAT circuit is coupled to the common node.~~

5. (Currently Amended) The apparatus of claim [4] 1, wherein the first bipolar device and the second bipolar device are ratio scaled with respect to one another.

6. (Original) The apparatus of claim 1, wherein the feedback circuit comprises at least one of: a passive feedback circuit, an active feedback circuit, a voltage divider circuit, a gain scaling circuit, a resistor divider circuit, a capacitive divider circuit, and a stacked diode circuit.

7. (Original) The apparatus of claim 1, wherein the feedback circuit corresponds to a voltage divider circuit that senses the output of the band-gap cell.

8. (Original) The apparatus of claim 1, wherein the PTAT circuit comprises at least one of: a voltage reference circuit that is configured to provide the second signal as a voltage, and a current reference circuit that is configured to provide the second signal as a current.

9. (Original) The apparatus of claim 1, wherein the PTAT circuit includes a bipolar junction device that is arranged to provide the second signal as a current that is proportional to absolute temperature.

10. (Original) The apparatus of claim 1, wherein the PTAT circuit includes a bipolar junction device that is arranged to provide the second signal as a voltage that is proportional to absolute temperature.

11. (Original) The apparatus of claim 1, wherein the PTAT circuit is arranged to activate when an operating temperature associated with the apparatus reaches a temperature trip point.

12. (Original) The apparatus of claim 1, wherein the band-gap cell is referenced from at least one of: a high supply signal, a low supply signal, and a ground reference signal.

13. (Original) The apparatus of claim 1, wherein the temperature compensated reference signal corresponds to at least one of a current and a voltage.

14. (Currently Amended) An apparatus for providing a temperature compensated reference signal, comprising:

a ~~bang-gap~~ band-gap cell means that is coupled between first common node and a power supply node, wherein the band-gap cell means is arranged to provide a first signal that has a first temperature response profile at the first common node, wherein the band-gap cell means is also arranged to provide an output at a second common node;

a PTAT means that is arranged to selectively provide a second signal that has a second temperature response profile at the first common node when active, wherein the second temperature response profile is proportional to absolute temperature;

a sense means that is arranged to sense ~~an~~ the output of the band-gap cell means at the second common node and selectively activate the PTAT means in response to the sensed output; and

a ~~signal combination~~ resistor means that is coupled between the second common node and the first common node, wherein the signal combination means is arranged to ~~adjust the temperature compensated reference signal in response to~~ combine the first signal and the second signal at the first common node such that the output of the band-gap cell at the second common

node corresponds to a temperature compensated reference signal ~~has~~ with a third temperature response profile that is determined by combination of the first temperature response profile and the second temperature response profile.

15. (Currently Amended) The apparatus of claim 14 ~~12~~, wherein the PTAT means comprises at least one of: a voltage reference means that is configured to provide the second signal as a voltage, and a current reference means that is configured to provide the second signal as a current.

16. (Currently Amended) The apparatus of claim 14 ~~12~~, wherein the PTAT means is arranged such that the second temperature response profile is proportional to absolute temperature.

17. (Currently Amended) The apparatus of claim 14 ~~12~~, wherein the band-gap cell means is ~~reference~~ referenced at the power supply node from at least one of: a high supply signal, a low supply signal, and a ground reference signal.

18. (Currently Amended) The apparatus of claim 14 ~~12~~, wherein the temperature compensated reference signal corresponds to at least one of a current and a voltage.

19. (Currently Amended) A method for providing a temperature compensated reference signal, comprising:

coupling a band-gap cell between a first common node and a power supply node;

coupling a resistor between the first common node and a second common node;

providing a band-gap voltage from the ~~a~~ band-gap cell at the second common node when the band-gap cell is active, wherein the band-gap cell is arranged to operate with ~~that has~~ a first temperature profile;

monitoring voltages at the second common node with a voltage divider to provide a feedback signal that is responsive to changes in the band-gap voltage ~~to provide a feedback signal~~;

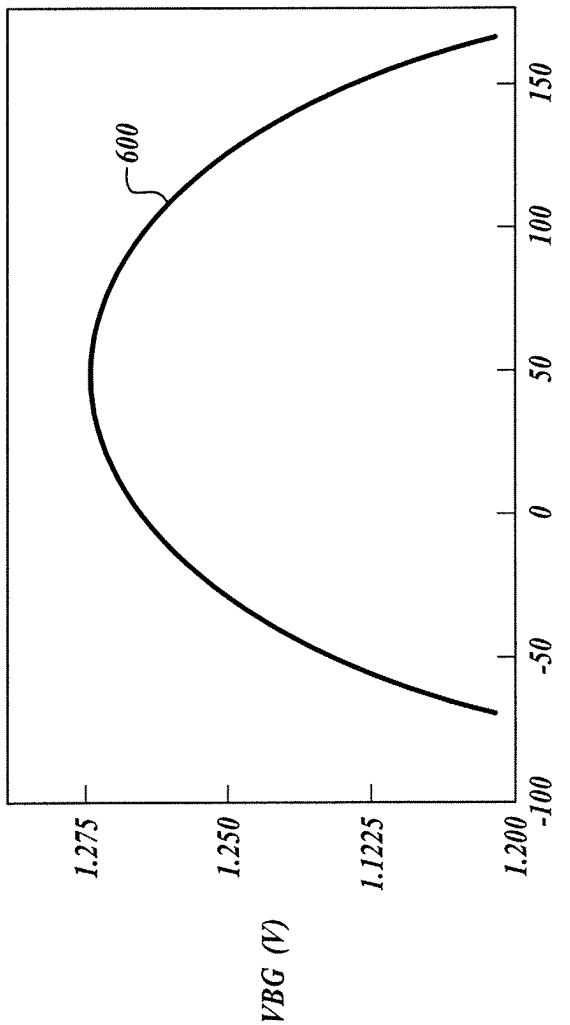
coupling the feedback signal to an input of a PTAT circuit ~~that has a second temperature profile~~;

activating the PTAT circuit in response to the feedback signal when an operating temperature associated with the ~~band-gap cell~~ PTAT circuit reaches a temperature trip-point; and

coupling ~~a~~ an output signal from the PTAT circuit to the first common node ~~the band-gap cell~~ when the PTAT circuit is active such that the temperature profile associated with the bang-gap voltage is modified by the PTAT circuit to create a third temperature profile that corresponds to the combined temperature profiles of the band-gap cell and the PTAT circuit.~~is provided to the band-gap voltage.~~

20. (Original) The method of claim 19, wherein the first temperature profile corresponds to a band-gap curve, the second temperature profile corresponds to a proportional to absolute temperature curve, and the third temperature profile corresponds to a curvature corrected band-gap curve.

REPLACEMENT DRAWING



(PRIOR ART)

FIGURE 6

REMARKS/ARGUMENTS

Claims 1 – 20 are pending in the present application. The drawings and abstract are object to for various informalities. Claims 1 – 18 are objected to. Claims 1 – 20 are rejected. Claims 1, 2, 5, and 14 – 19 are amended. Claim 4 is cancelled. No new matter is added.

Objection to the Drawings

FIG. 5 is objected to for failing to comply with 37 CFR 1.84(p)(5). In particular, FIG. 5 lacks a label for the term "VOUT" that is described in the specification, and also because FIG. 5 includes a reference label "500" that is properly referenced in the specification. The specification has been amended to remove the label "VOUT" in favor of label "VREF", which is already included in FIG. 5. The specification has also been amended to include the reference to label "500", which simply refers to the entire circuit schematic. It is believed that the objection to FIG. 5 is overcome by this amendment and notice to that effect is requested.

FIG. 6 is objected to for failing to have a designation of "PRIOR ART". A replacement sheet for FIG. 6 is included with this response, where the replacement sheet has the designation of "PRIOR ART." It is believed that the objection to FIG. 6 is overcome by this amendment and notice to that effect is requested.

Objection to the Specification

The abstract of the disclosure is objected to for describing various merits of the invention, and for including a customer number that is not necessary. In accordance with the Examiner's request, the abstract of the disclosure has been amended to remove the last sentence, and also

remove the customer number. It is believed that the objection to specification is overcome by this amendment and notice to that effect is requested.

Objection to the Claims

Claims 1 – 18 are objected to for various informalities. In particular claims 1, 14 and 15 have been objected to for various typographical errors that are now corrected by way of amendment.

Rejection of the Claims under 35 U.S.C. § 112

Claims 1 – 20 are objected to under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention. In particular, the Examiner noted points of confusion or errors with regard to claims 1, 2, 4, and 15 – 17.

Applicants wish to thank the Examiner for such a thorough review. Claim 4 is cancelled, and claims 1, 2 and 15 – 17 are amended. It is believed that the rejection of the claims under 35 U.S.C. § 112 is overcome, and notice to that effect is kindly requested.

Applicant has reviewed each of the pending claims, and further amended claim 18 to properly depend from claim 14 instead of claim 12.

Allowable Subject Matter

Claims 4 – 5 are indicated as allowable if rewritten to overcome the objections and rejections under 35 U.S.C. § 112. Claim 4 has been cancelled and its limitations have been properly incorporated into now amended claim 1. Claims 2, 3 and 5 – 13 now properly depend

from claim 1 and are thus also propsed to be allowable. Therefore, it is believed that claims 1 – 3 and 5 – 13 are in proper form for allowance, and notice to that effect is requested.

Rejection of the Claims under 35 U.S.C. § 102

Claims 1 – 3 and 6 – 20 are rejected under 35 U.S.C. § 102, second paragraph as being anticipated by U.S. Patent No. 4,939,442 (the '442 patent) to Carvajal et al. Claims 1 – 13 are considered allowable for the reasons previously stated above. Claims 14 – 20 are further proposed to be allowable for the reasons stated below.

Claim 14 as amended includes at least the following limitations not disclosed, taught or otherwise suggested in the '442 patent:

> "a signal combination resistor means that is coupled between the second common node and the first common node, wherein the signal combination means is arranged to adjust the temperature compensated reference signal in response to combine the first signal and the second signal at the first common node such that the output of the band-gap cell at the second common node corresponds to a temperature compensated reference signal has with a third temperature response profile that is determined by combination of the first temperature response profile and the second temperature response profile."

The '442 patent does not teach coupling a resistor means between the second common node and the first common mode, where the resistor means is arranged to combine two signals with different temperature response profiles. Since these features, as they relate to the other structural features are not described or otherwise taught in the '442 reference, it is believe that claim 14 is allowable for at least that reason. Claims 15 – 18 depend upon and further limit claim 14, and are thus also believed to be allowable. Claims 14 – 18 are now in proper form for allowance and notice to that effect is requested.

Claim 19 as amended includes at least the following limitations not disclosed, taught or otherwise suggested in the '442 patent:

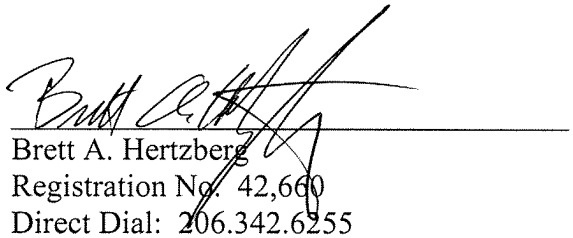
> "coupling a band-gap cell between a first common node and a power supply node;"
>
> "coupling a resistor between the first common node and a second common node;"
>
> "monitoring voltages at the second common node with a voltage divider to provide a feedback signal that is responsive to changes in the band-gap voltage;"
>
> "coupling an output signal from the PTAT circuit to the first common node when the PTAT circuit is active such that the temperature profile associated with the bang-gap voltage is modified by the PTAT circuit to create a third temperature profile that corresponds to the combined temperature profiles of the band-gap cell and the PTAT circuit."

The '442 patent does not teach coupling a resistor between the first common node and the second common mode, nor does the '442 patent teach monitoring voltages at the second common node with a voltage divider to provide the feedback signal responsive to changes in the band-gap voltage. Moreover, the other described claim elements in Applicant's amended claim 19 includes steps that require additional structural connectivity such as, for example, the band-gap cell being coupled to the resistor, which in effect couples the signals together, at two places (i.e., the second common node and the first common node). Since these features, as they relate to the other structural features are not described or otherwise taught in the '442 reference, it is believe that claim 19 is allowable for at least that reason. Claim 20 depends upon and further limit claim 19, and are thus also believed to be allowable. Claims 19 – 20 are now in proper form for allowance and notice to that effect is requested.

In view of the foregoing amendments and remarks, all pending claims are believed to be allowable and the application is in condition for allowance. Therefore, a Notice of Allowance is respectfully requested. Should the Examiner have any further issues regarding this application, the Examiner is requested to contact the undersigned attorney for the applicant at the telephone number provided below.

Respectfully submitted,

MERCHANT & GOULD P.C.



Brett A. Hertzberg
Registration No. 42,660
Direct Dial: 206.342.6255

MERCHANT & GOULD P.C.
P. O. Box 2903
Minneapolis, Minnesota 55402-0903
206.342.6200
(BAH/ab)

TO:Auto-reply fax to 206 34[illegible] 6201 COMPANY:

Auto-Reply Facsimile Transmission

COPY

TO: Fax Sender at 206 342 6201

Fax Information
Date Received: 1/22/2007 10:20:01 PM [Eastern Standard Time]
Total Pages: 32 (including cover page)

ADVISORY: This is an automatically generated return receipt confirmation of the facsimile transmission received by the Office. Please check to make sure that the number of pages listed as received in Total Pages above matches what was intended to be sent. Applicants are advised to retain this receipt in the unlikely event that proof of this facsimile transmission is necessary. Applicants are also advised to use the certificate of facsimile transmission procedures set forth in 37 CFR 1.8(a) and (b), 37 CFR 1.6(f). Trademark Applicants, also see the Trademark Manual of Examining Procedure (TMEP) section 306 et seq.

Received Cover Page =======>

01-22-07 07:18PM FROM-MERCHANT & GOULD P C 206-342-6201 T-844 P 001 F-015

Merchant & Gould
An Intellectual Property Law Firm

701 Fifth Avenue, Suite 4100
Seattle Washington
98104-7097 USA
tel. 206.342.6200
fax 206.342.6201
www.merchant-gould.com

A Professional Corporation

Fax Transmission | January 22, 2007

TO: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

FROM: Brett A. Hertzberg

OUR REF: 50019.273US01/P05808
[BAH/zh]

Total pages, including cover letter: _____

PTO FAX NUMBER 1-571-273-8300

If you do NOT receive all of the pages, please telephone us at 206 342.6200, or fax us at 206 342.6201.

Documents Transmitted. Fax Coversheet; Amendment

Title:	CURVATURE CORRECTED BANDGAP CIRCUIT
Applicant:	Siew Siong Teo
Serial No.:	10/809,635
Filed:	March 24, 2004
Group Art Unit:	2838
Our Ref. No.:	50019.273US01/P05808
Confirmation No.	6095

Please charge any additional fees or credit overpayment to Deposit Account No. 13-2725. Please consider this a PETITION FOR EXTENSION OF TIME for a sufficient number of months to enter these papers, if appropriate.

I hereby certify that this paper is being transmitted by facsimile to the U.S. Patent and Trademark Office on the date shown below.

Dated: January 22, 2007

By: _____
Name: Brett A. Hertzberg
Reg. No. 42,660

3890433 DOT

PAGE 1/32 * RCVD AT 1/22/2007 10:20:01 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-5/9 * DNIS:2738300 * CSID:206 342 6201 * DURATION (mm-ss):04-12

Merchant & Gould

An Intellectual Property Law Firm

701 Fifth Avenue, Suite 4100
Seattle, Washington
98104-7097 USA
TEL 206.342.6200
FAX 206.342.6201
www.merchant-gould.com

A Professional Corporation

COPY

Fax Transmission | January 22, 2007

TO: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

FROM: Brett A. Hertzberg

OUR REF: 50019.273US01/P05808
[BAH/ab]

Total pages, including cover letter: _____

PTO FAX NUMBER 1-571-273-8300

If you do NOT receive all of the pages, please telephone us at 206.342.6200, or fax us at 206.342.6201.

Documents Transmitted: Fax Coversheet; Amendment

Title:	CURVATURE CORRECTED BANDGAP CIRCUIT
Applicant:	Siew Siong Teo
Serial No.:	10/808,635
Filed:	March 24, 2004
Group Art Unit:	2838
Our Ref. No.:	50019.273US01/P05808
Confirmation No.	6093

Please charge any additional fees or credit overpayment to Deposit Account No. 13-2725. Please consider this a PETITION FOR EXTENSION OF TIME for a sufficient number of months to enter these papers, if appropriate.

I hereby certify that this paper is being transmitted by facsimile to the U.S. Patent and Trademark Office on the date shown below.

Dated: January 22, 2007

By: _____
Name: Brett A. Hertzberg,
Reg. No. 42,660